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Comparison of listeriosis notifications and Hospital Dismissal Records in Piedmont, Northern Italy (2010-2013): how many cases are we really detecting?

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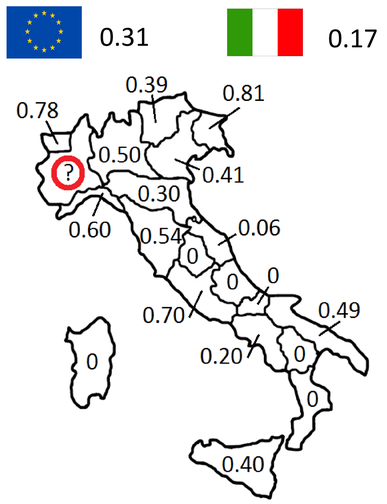
Introduction

Listeriosis is a foodborne disease caused by *Listeria monocytogenes*, with high hospitalization (up to 90%) and mortality rates (20-50%) [1].

Listeriosis cases are to be notified to the European Community (EC) through a chain of communication from hospital medical staff to the Health Ministry of each member state [2].

Fig. 1: The flags show the European and Italian yearly incidence (cases/100,000 inhabitants) of listeriosis in 2009, in the map is reported the incidence for each italian region [3, 4].



The aim of this study was to assess whether the number of reported listeriosis cases in Piedmont (Northern Italy) was accurate, by conducting a retrospective comparison of official notification data with Hospital Dismissal Records (HDRs) listing listeriosis as diagnosis. In addition, in order to get an insight of the epidemiology of *L. monocytogenes* in our region we collected and typed clinical strains isolated in the hospitals.

Results

Retrospective database analysis

Our analysis showed that 28 cases that listed listeriosis as a diagnosis in the HDRs had not been notified. When only the notification data were considered, the observed yearly incidence in Piedmont ranged from 0.13-0.34 cases/100.000 inhabitants. This rate was adjusted to 0.29-0.53 cases/100.000 inhabitants when HDRs data were accounted (Tab. 1). Overall, 62% of total listeriosis cases were observed in patients above 65 years of age, 2% of cases were pregnancy related.

Strain collection and typing

To date, 19 clinical strains of *L. monocytogenes* have beem collected. MVLST (Fig. 4) revealed that 42% of the strains (n=8) had a genetic profile (Virulence Type - VT) matching that of an Epidemic Clone (EC), previously defined as strains or group of strains responsible for at least two listeriosis outbreaks not related in space and time. Four cases belonged to VT79 (n=2) and VT80 (n=2), VTs previously identified as outbreak clones (OCs) during the 2012 ricotta salata outbreak [5]. Two isolates have been identified as VT11, often found worldwide in food and food processing environment [5]. One isolate belonged to VT113, previously observed in several cheese production plants in Piedmont [5]. Finally, one isolate did not match any previously observed VT and therefore was arbitrarily assigned a new one (VT121) (Fig. 4).

Fig. 2: Yearly count of listeriosis cases notified in Piedmont (red) and comparison with Hospital Dismissal Records (blue).

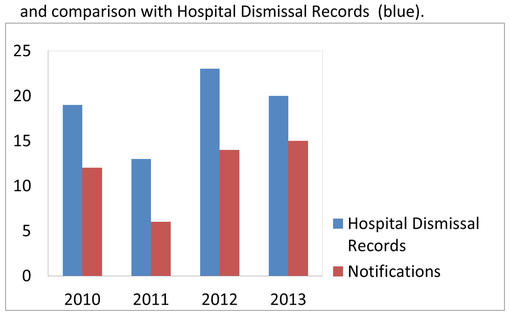
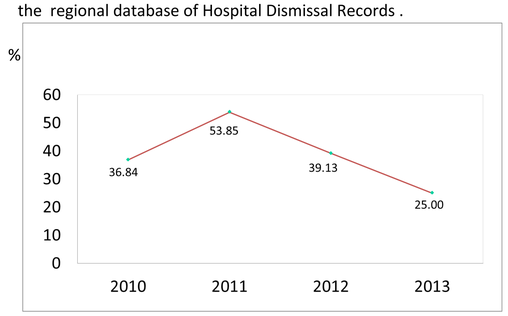


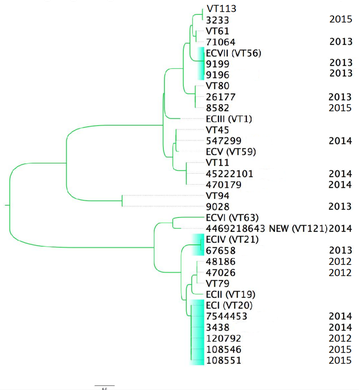
Fig. 3: Yearly percentage of unnotified listeriosis cases according to the regional database of Hospital Dismissal Records .



Tab. 1: Yearly and average incidence (cases/100,000 inhabitants) of listeriosis in Piedmont, calculated on notification data (*a*) and adjusted when taking in account data from the Hospital Dismissal Records (*b*).

Year	Incidence reported through notifications [a]	Incidence adjusted with Hospital Dismissal Records[b]
2010	0.27	0.43
2011	0.13	0.29
2012	0.32	0.53
2013	0.34	0.45
Average	0.26	0.42

Fig. 4: Unrooted neighbor-joining tree for MVLST data obtained for the 19 *Listeria monocytogenes* isolates collected in this study, and year of isolation. Green highlighting indicates strains classified as epidemic clones.



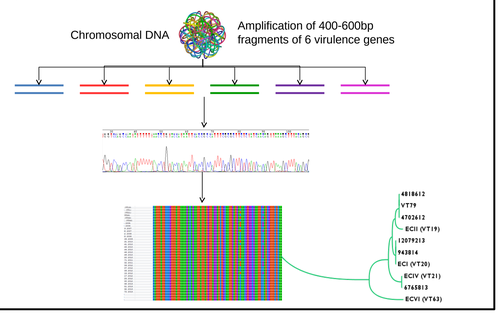
Materials and methods

Retrospective database analysis

Notifications and HDRs data for 2010-2013 were retrieved from the database of the Regional Infective Disease Service and analyzed. The two databases were merged and data for the same single clinical case were paired.

Strain collection and typing

All regional hospitals were asked to send *L. monocytogenes* clinical isolated for diagnosis to our department for molecular subtyping with Multi Virulence Locus Sequence Typing (MVLST):



Conclusions

Our results showed that overall, every year nearly 40% of human listeriosis cases diagnosed in Piedmont are not notified.

Moreover, the percentage of pregnancy related cases is lower compared to other countries (reporting 10-20%), probably because causes of miscarriage are seldom investigated.

Currently there is no systematic clinical *Listeria monocytogenes* strain collection in Piedmont, so the collection of even relatively few human isolates and their further characterization could be important to start implementing listeriosis surveillance strategies. Combining MVLST of human cases with data of strains isolated in food might be useful in the identification of ongoing outbreaks.

These findings highlight the general need to raise awareness of the presence of listeriosis on the regional territory among the medical staff, through a better understanding of the epidemiology of this disease and of its notification procedures.

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